

*Quercus* 1903a, 1907a, 1909a,d,f, 1913c, 1920d, 1921a,f, 1923b. *Rhus* 1893d. *Salix* 1909a. *Salvia* 1908c. *Scrophularia* 1899b. *Sequoia* (including *Sequoiadendron*) 1896c, 1908h, 1912a,e, 1913d, 1914c,d, 1920a,b,c, 1921d, 1923g, 1929g, 1933j, 1935a, 1941, 1943b. *Umbelliferae* 1893a, 1923–29. *Umbellularia* 1903c. *Velezia* 1897d. *Washingtonia* 1908a. *Wyethia* 1909i. *Xerophyllum* 1898g. *Yucca* 1931f.

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Jepson Herbarium, University of California, Berkeley

California Academy of Sciences, San Francisco

## ON THE HORDEUM JUBATUM—H. BRACHYANTHERUM QUESTION

WM. W. MITCHELL

Rajhathy (1966) disagrees with the separate species status recommended by Mitchell and Wilton (1964) for *Hordeum jubatum* L. and *H. brachyantherum* Nevski. He accepts proof of interbreeding as the overriding criterion for making species determinations; he considers that the above disposition ignores a "mass of evidence" obtained on the interbreeding of these taxa in the Canadian and American West and Midwest. Rajhathy also asserts that the Alaskan work is further invalidated by being based on a "specialized peripheral situation."

Alaska is on the northwestern periphery of the North American range

of *H. jubatum*. The species is nonetheless well adapted to subarctic conditions, occurring frequently and abundantly on disturbances throughout the Interior south of the Brooks Range and in the south-central region transitional to the coast. The propensity of *jubatum* for hybridization appears not in the least affected by Alaskan conditions since it hybridizes frequently with various species (Mitchell and Hodgson, 1965). Alaska hardly can be considered peripheral with regard to the range and adaptability of *H. brachyantherum*. The Alaskan occurrences of *brachyantherum* include much of its principal range along the coastal arc of the Pacific Ocean. The species frequents eastern Asia, is common through the Aleutian Islands and along the coast of Alaska to the panhandle, and extends southward to California. It occurs in well-developed beach meadows, invades disturbed ground, and is a very abundant weed in many Alaskan coastal communities. The species ranges inland along the highway and railway systems of southcentral Alaska. *Hordeum jubatum* and *H. brachyantherum* meet and hybridize in this southcentral region.

Bowden (1962) examined about 160 specimens of *brachyantherum* in the study which led to his combining *jubatum* and *brachyantherum*. Of a total of 82 accessions listed, 50 originated in British Columbia and Alaska, 8 in Alberta, and 2 in Saskatchewan. Moss (1959) stated *brachyantherum* to be "very rare" in Alberta, a plant of saline situations. It is absent in Manitoba (Scoggan 1957) and in areas of Saskatchewan and neighboring United States where the hybrid occurs in abundance (Bowden, 1962; Rajhathy, 1966). Obviously *brachyantherum* prefers the summer-cool and moist coastal region of the North.

Apparently the hybrid is most successful in areas where *brachyantherum* is rare or absent and preserves its identity after migration from its site of origin. In controlled crosses (Rajhathy and Morrison, 1959) even the F<sub>2</sub> plants maintained this identity, remaining "indistinguishable from the F<sub>1</sub> plants," although the F<sub>3</sub> and F<sub>4</sub> plants segregated for awn length (Rajhathy, 1966). Bowden (1962) reported little segregation in F<sub>2</sub> generations that he examined. The hybrid has been recognized by many taxonomists as a variety of *jubatum* (Covas, 1949; Hitchcock, 1950; Scoggins, 1957; Löve, 1959).

In all probability *jubatum* and *brachyantherum* have had a common ancestry (Rajhathy and Morrison, 1959; 1961). But the large amount of morphologic and chorologic differentiation now manifest between the two reflects a successful divergence and reproductive separation effective over a long period of time. The fact that the two produce hybrids on disturbances today is not unusual since *jubatum* hybridizes with numerous species in three or four genera. The production of fertile hybrids is of significance, but it occurs principally in an area that must be considered marginal for *brachyantherum*. Moreover, the effects on the integrity of the *brachyantherum* populations prevalent in this area cannot be ascertained from the data now available.

The increase of the hybrid in the areas where *brachyantherum* is absent must depend on the compatibility of the hybrid with its own kind or with *jubatum*. *Hordeum brachyantherum* cannot be involved in this proliferation. In fact, data from analyses of naturally-occurring, interbreeding populations have not been published from this northern interior area to show that intergrading is indeed taking place. We do not know if backcrossing is occurring, in particular with *brachyantherum*; nor do we know if the ecologically successful hybrid has had any competitive impact on the sparsely-occurring *brachyantherum*. *Hordeum brachyantherum* quite possibly is being eliminated without intergrading with the hybrid.

Our observations and analyses of interbreeding populations (Mitchell and Wilton, 1964) indicate *brachyantherum* is maintaining a separate identity in a substantial portion of its principal range. Such hybridization as occurs in Alaska is not, according to the evidence, producing an incorporation of the gene complexes of *jubatum* and *brachyantherum*. The two species are morphologically distinctive, ecologically at variance except where they meet in disturbances, and for the most part geographically separate as well.

These interpretative differences with the research workers of Ottawa are in no way intended to detract from their excellent cytogenetic and taxonomic work on taxa of the Triticeae.

University of Alaska Agricultural Experiment Station, Palmer, Alaska

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